Claims

Cancel all claims of record and substitute currently amended claims 1, 8; 13, 15, 18, 19, 20-27; previously presented claims 2-6, 10-12, 14, 16-17, canceled claim 7; and original claim 9; as follows:

1. (currently amended): Apparatus for the collection and focusing of gas-phase ions or particles at or near atmospheric pressure, the apparatus comprising:

a. a dispersive source of ions;

b. a conductive high transmission surface populated with a plurality of holes through which said ions pass unobstructed on the way to a collector target, aperture, or tube; said high transmission surface having a topside and an underside, said high transmission surface being supplied with an attracting electric potential by connection to a voltage supply, and generating an electrostatic field between said source of ions and said topside of said high transmission surface; said high transmission surface also being shaped to affect high focusing fields on the focusing side, underside, of said high transmission surface, whereby said electrostatic field at said underside of said high transmission surface is greater than said electrostatic ~~filed~~ field at said topside of said high transmission surface;

c. a target surface for receiving ions or transmitting focused ions through opening of target aperture, or tube in said target surface; said target surface held at a second ion-attracting and higher strength electric potential by connection to said voltage supply, and generating an electrostatic field between said underside of said high transmission surface and said opening of said target aperture or tube which has electrostatic field lines that are concentrated on a relatively reduced cross-sectional area of said target surface, said opening of said target aperture, or opening of said tube;

d. an inner field-shaping electrode for focusing ions exiting the underside of said high transmission surface whereby approximately all said ions are focused toward said reduced cross-sectional area on said target surface.

2. (previously presented): Apparatus as in claim **1** wherein said target surface comprises a conductive end of a capillary tube, wherein said capillary tube is the atmospheric or near atmospheric pressure inlet to the vacuum chamber of a mass spectrometer.

3. (previously presented): The apparatus of claim **1** wherein said inner field-shaping electrode is a metal electrode whereby said electrostatic potential from said target surface penetrates into a focusing region between the underside of said high transmission surface and said metal electrode through a single central aperture in said metal electrode.

4. (previously presented): The apparatus of claim **1** wherein said inner field-shaping electrode is a metal electrode held at the same potential as said high transmission surface.

5. (previously presented): The apparatus as in claim **1** further including an analytical apparatus in communication with said target aperture or tube in said target surface, wherein said aperture or tube is interposed between the underside of said high transmission surface and said analytical apparatus, said reduced cross-sectional area of ions being directed through said opening of said target aperture or tube into said analytical apparatus.

6. (previously presented): Apparatus as in claim **5** wherein said analytical apparatus comprises a mass spectrometer or ion mobility spectrometer or combination thereof.

7. (canceled).

8. (currently amended): Apparatus as in claim **1** wherein said gas-phase ions are formed by means of an atmospheric or near atmospheric ionization source; electrospray, atmospheric pressure chemical ionization, laser desorption, photoionization, or discharge ionization sources; or inductively coupled plasma ionization source; or a combination thereof.

9. (original): Apparatus of claim **8** wherein said atmospheric or near atmospheric ionization source is made up of a plurality of said atmospheric or near atmospheric ion sources operated simultaneously or sequentially.

10. (previously presented): Apparatus of claim **1**, wherein said target surface, is made up of a plurality of said focal points resulting from mechanical variations of said inner field-shaping electrode's position and shape, ions or charged particles collected at said focal points, being accumulated onto said target surface for collection or passed through said opening in said target aperture or tube for analysis.

11. (previously presented): Apparatus in claim **1** further including a pure gas supplied between said target surface and said inner field-shaping electrode, or between said inner field-shaping electrode and said high transmission surface, whereby substantially all said gas flows into said focusing region between said inner field shaping electrode and said high-transmission surface and through said plurality of holes in said high transmission surface.

12. (previously presented): An apparatus in claim **1** further including an outer field-shaping electrode surrounding the circumference of said high transmission surface; said outer field-shaping electrode held at a potential the same or slightly above the potential on said high transmission surface, said outer field-shaping electrode functioning to shield topside of said high transmission surface from high electrostatic fields found in some needle containing source

regions that suppress said electrostatic field penetration from said focusing region into said ion source region.

13. (currently amended): Apparatus for the collection and focusing of an aerosol of gas-phase charged droplets or particles at or near atmospheric pressure, the apparatus comprising:

a. a source of charged droplets or particles;

b. a conductive high transmission surface with a plurality of holes through which said aerosol of charged droplets pass unobstructed on the way to a target surface, said high transmission surface having a topside and an underside, said high transmission surface being supplied with an attracting electrostatic potential by connection to a voltage supply, and generating an electrostatic field between said source of charged droplets~~, from said atmospheric ionization source,~~ and said topside of said high transmission surface, whereby said electrostatic field at said underside of said high transmission surface is greater than said electrostatic field at said topside of said high transmission surface;

c. a target surface for receiving said charged particles, said target surface being supplied with a second ion-attracting and higher strength electrostatic potential by connection to said voltage supply, and generating an electrostatic field between said underside of said high transmission surface and said target surface whereby electrostatic field lines are concentrated to a reduced cross-sectional area on said target surface;

d. an inner field-shaping electrode for focusing said charged particles exiting said underside of said high transmission surface whereby approximately all said charged droplets are focused onto said target surface.

14. (previously presented): The apparatus of claim **13** wherein said inner field-shaping electrode is a metal electrode whereby said electrostatic field from said target surface penetrates into a focusing region between said underside of said high transmission surface and said inner field-shaping electrode through a central aperture in said inner field-shaping electrode.

15. (currently amended): The apparatus of claim **13** wherein said charged droplets or particles are formed by means of atmospheric or near atmospheric pressure ionization source; electrospray, atmospheric inductive charging, discharge, or electron capture ionization sources; or combination thereof.

16. (previously presented): The apparatus of claim **15** wherein said atmospheric or near atmospheric ionization source is made up of a plurality of sources.

17. (previously presented): The apparatus of claim **13** wherein said target surface is made up of a plurality of targets whereby position and time dependence of focal points of said electrostatic field lines are determined by variation in the geometry, position, and potential of said inner field-shaping electrode.

18. (currently amended): A Method for the transfer of charged particles or ions from a highly dispersive area or source at or near atmospheric pressure and focusing approximately all said charged particles or ions into an inlet aperture for gas-phase ion analysis, the method comprising:

a. providing electrostatic attraction to said charged particles or ions with electrostatic fields provided by a perforated high transmission surface, said perforated high transmission surface having an ion drawing potential, such that electrostatic field lines between said source of gas-phase charged particles or ions and said perforated high transmission surface are concentrated on the topside of said perforated high transmission surface;

b. transmitting said charged particles or ions through said perforated high transmission surface by allowing the unobstructed passage into a focusing region by providing a plurality of holes in said perforated high transmission surface with low depth aspect ratio, a high openness aspect ratio, and a ~~electrostatic potential~~ an electrostatic potential ratio greater than one, between the underside and said topside of said perforated high transmission surface and;

c. providing electrostatic attraction to said charged particles or ions in said focusing region with a second electrostatic field generated by a target surface, said target surface having an ion-drawing potential such that electrostatic field lines between said underside of said perforated high transmission surface and ~~said inlet aperture~~ an inlet aperture in said target surface are concentrated onto said target surface urging approximately all said charged particles or ions in said focusing region to be directed towards said target surface whereby approximately all said charged particles or ions flow into said inlet aperture as a reduced cross-sectional area.

19. (currently amended): Method as in claim **18**, ~~wherein providing the transfer of said charged particles or ions from said highly dispersive source at or near atmospheric pressure for gas-phase ion analysis, comprises said inlet aperture~~ wherein said inlet aperture is provided at a focal point of said reduced cross-sectional area so that a substantial fraction of said charged particles or ions are transmitted to a mass spectrometer or ion mobility spectrometer or a combination thereof.

20. (currently amended): Method as in claim **18,** ~~wherein providing the transfer of said charged particles or ions from said highly dispersive source at or near atmospheric pressure for gas-phase ion analysis, comprises a means of additional electrostatic focusing~~ further comprising providing a means for

additional electrostatic focusing to said charged particles or ions in said focusing region, said additional focusing having an ion-drawing potential such that said electrostatic field lines are primarily concentrated on said inlet aperture whereby approximately all said charged particles or ions are urged into said inlet aperture in said target surface.

21. (currently amended): Method as in claim **18**, wherein ~~providing the transfer of said charged particles or ions from said highly dispersive source at or near atmospheric pressure for gas-phase ion analysis,~~ said inlet aperture is an inlet of an atmospheric pressure interface of a mass spectrometer.

22. (currently amended): Method as in claim **18**, ~~wherein providing the transfer of said charged particles or ions from said highly dispersive source at or near atmospheric pressure for gas-phase ion analysis, comprises~~ further comprising providing a plurality of focal points on said target surface.

23. (currently amended): Method as in claim **18**, wherein ~~providing the transfer of said charged particles or ions from said dispersive source at or near atmospheric pressure for gas-phase ion analysis,~~ said inlet aperture is an inlet of an ion mobility spectrometer.

24. (currently amended): Method as in claim **18**, ~~wherein providing the transfer of said charged particles or ions from said dispersive source at or near atmospheric pressure for gas-phase ion analysis, comprises~~ further comprising providing a plurality of dispersive sources of said charged particles or ions.

25. (currently amended): Method as in claim **18,** wherein ~~providing the transfer of said charged particles or ions from said highly dispersive source at or near atmospheric pressure for gas-phase ion analysis,~~ said ~~electrostatic field~~ electrostatic potential ratio at points equidistant from the upstream or said

topside surface of said high transmission surface and downstream or said underside surface of said high transmission surface is greater than 10 to 1 with said downstream (focusing side) having the greater magnitude.

26. (currently amended): Method as in claim **18** further comprising feeding a pure gas between said inlet aperture and said perforated high transmission surface, or between said additional electrostatic focusing means and said perforated high transmission surface, whereby approximately all said gas passes into said focusing region and through said plurality of holes in said perforated high transmission surface preventing larger particles from crossing said perforated high transmission surface from said source region into said focusing region.

27. (currently amended): Method as in claim **18,** wherein ~~providing the transfer of said charged particles or ions from said highly dispersive source at or near atmospheric pressure for gas-phase ion analysis,~~ said ~~electrostatic field~~ electrostatic potential ratio at points equidistant from the upstream ~~of~~ or said topside surface of said high transmission surface and downstream ~~of~~ or said underside surface of said high transmission surface is greater than 1 to 1 with said downstream (focusing side) having the greater magnitude.